

PATENT SPECIFICATION

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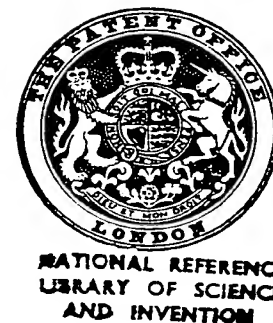
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DRAWINGS ATTACHED

(19)

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(54) NON-WOVEN PILE FABRIC FOR CARPETS

(71) We, CARL FREUDENBERG, a German Company (a Kommanditgesellschaft the present personally responsible partners of which are HELMUT FABRICIUS, HANS ERICH FREUDENBERG, KURT KRAFT, OTTO SCHILDHAUER, PETER WENTZLER, HERMANN FREUDENBERG and DIETER FREUDENBERG) of 6940, Weinheim Bergstrasse, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

Carpets are already known in which the top surface is formed of a needled web of fibres. Usually such carpets have been made by needling the web onto a woven backing fabric, such as a woven jute fabric. One disadvantage of such carpets is that the needling damages the woven backing fabric with the result that its strengthening properties are reduced. Another disadvantage of these carpets is that the fibres of the web can quite easily be removed from the carpet by pulling, and are therefore liable to be removed from the carpet during normal wear.

Another disadvantage arises in that it is often desirable to treat the carpets with a fungicidal or bactericidal agent and, as the fibres of the web are usually synthetic fibres, it is difficult to render the web permanently bacteria resistant. A finishing composition containing a fungicidal bactericide could be applied to the needled carpet but in general the fungicidal and bactericidal agents do not adhere long enough and the application of the finishing composition may cause the carpet to hold dirt more readily than it would otherwise.

It is already known to impregnate with a binder throughout their thickness needled

webs of fibres and carpets have been made of a web needled onto a woven backing and impregnated throughout with a binder. Also it is possible to make carpets from the web without a backing if the web is impregnated throughout with a binder. However all these carpets have a rather coarse feel.

A carpet material according to the invention comprises a needled web of fibres having a pile surface and a backing surface and that has been made by impregnating from its backing surface with a binder to from half to three quarters of its thickness.

The invention is illustrated in the accompanying drawings in which Figure 1 shows diagrammatically a section through a needled web suitable for use in the invention prior to impregnation and Figure 2 is the same section of the same web after impregnation.

The web of fibres 1 can be formed in any conventional manner, for example on a card, and initially the fibres 1 predominantly lie parallel to the surface of the web. The web is then needled as a result of which fibres 2 are carried by the needles across the thickness of the web. The web may be needled more than once and may be needled during its formation. Thus it may be built up of successive layers of fibres and each layer may be needled before the next layer is laid on it.

It is particularly advantageous in the invention that the fleece should be needled from one surface, 6, only since this results in the displaced fibres 2 predominantly being arranged with loops 3 adjacent the surface 6 and free ends 4 adjacent the opposite surface of the web, 7. Of course the arrangement shown in Figure 1 is greatly over simplified.

The web is then impregnated from one side only with binder 5. When, as is pre-

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ferred, the displaced fibres 2 are arranged with more of their loops 3 adjacent one surface (6) than the other surface, it is preferred that the impregnation be from this surface 6. Impregnation must not extend throughout the thickness of the web and is preferably conducted by applying to one surface of the web a latex having a high solids content and in the form of a foam. Suitable methods of applying foamed latices are described, in, for example, U.S. Specification No. 2,719,802. The method may involve causing the needled web to run through the gap between two rolls while foamed latex is applied between one of the rolls and the web. The extent of penetration of the foam, and thus the depth of impregnation, can be controlled by appropriate selection of the density of the foam and the gap between the rolls and the speed of travel of the web.

The resultant material, as shown in Figure 2, is then used with the impregnated side 6 serving as the backing surface and the non impregnated side, 7, serving as the pile, or wear, surface. The resultant carpet thus has a much softer feel than carpets of wholly impregnated webs.

If the web is impregnated to less than about half its thickness it will be found that the fibres in the pile may not be adequately held into the carpet. If the web is impregnated to more than about three quarters of its thickness then the desirable pile effect tends to be lost and the carpet becomes harder. Thus impregnation to around two thirds of the way through the thickness of the web yields a satisfactory balance between the need to achieve adequate bonding and the desire to have a soft surface texture.

The needled web is generally at least 2 millimeters thick and most usually is at least 3 or at least 4 millimeters thick. Its fibre weight is usually at least 200 grams per square meter, and is often at least 300 or 400 grams per square meter. The fibres of which it is formed usually have a denier of at least 3, and most usually at least 5 or even at least 10. At least a substantial proportion of the fibres of the web, namely at least 50%, and preferably all the fibres, are of polypropylene.

The binder is preferably a self cross-link-

ing styrene-butadiene latex in which event satisfactory curing occurs on drying the web at 120°C for a short time after impregnation. If the latex is not self cross-linking, then it may be heated to a higher temperature for a longer time in order to obtain adequate curing.

A bactericide or fungicide may be impregnated with the binder and thus this also will only extend half to three quarters of the way through the web. However it is surprisingly found that the bactericidal or fungicidal agents in the binder are effective also in preventing fungal or bactericidal growth in the non-impregnated part of the web. Small amounts only of the agents are required, for example 0.05 to 1% with respect to the final weight of the material. Naturally the agents used must not be impaired seriously either by the other components of the binder or by the heat treatment to which the web may be subjected after impregnation.

The backing surface of the web, 6, can be adhered to a sheet support material or other stiffening base, for example, a woven fabric, a bitumen film, a P.V.C. foam or cork.

The material can be marketed in the form of tiles having a size of, for example, 30cm × 30cm. Due to the tiles having a soft pile surface the edges of the tiles blend into one another more satisfactorily than occurs when the webs are impregnated throughout the thickness and thus the edges are substantially invisible.

If desired a special visual effect can be obtained by shaving off part of the pile, i.e. by cutting off the projecting free ends of the fibres. Conventional apparatus, such as is used for shearing sheep, can be used for this purpose. The shorn surface may have a velvety appearance.

The following is an example of the invention.

A fibre fleece with a weight of 450 g/m² is prepared from polypropylene fibres with an average length of 60 mm and a thickness of 15 den. This fleece is thereafter needled and then impregnated with a 50% butadiene-styrene latex by the foam impregnating method. 12.7 g of an addition mixture is added to 100 g of this latex. This addition mixture itself consists of:

0.2	parts	by	weight	of	sulphur
5.0	"	"	"	"	zinc oxide
3.0	"	"	"	"	tetramethylthiuramdisulphide
1.0	"	"	"	"	2-mercaptobenzimidazole
0.5	"	"	"	"	a salt of a naphthalene sulphonic acid sold under the Registered Trade Mark "Vultramol"
15.0	"	"	"	"	water

Impregnation is then carried out to about two thirds below the pile-like surface up to an absorption of liquid of between 90 and 140% and drying and vulcanisation are then carried out. In the present case, the "Vultamol" acts as a dispersing agent, the 2-mercaptopbenzimidazole as an age register, and the tetramethylthiuramdisulphide as a fungicidal and/or bactericidal agent. The growth of bacteria or fungi on a carpet of this kind is, for instance, not more than 5% of the growth that is observed when the fungicide is not used.

Similar results are obtained when quaternary ammonium compounds are employed as active agent instead of tetramethylthiuramdisulphide, and the bacterial and fungicidal effect can be increased by the use and addition of further active agents.

WHAT WE CLAIM IS:—

1. A carpet material comprising a needled web of fibres having a pile surface and a backing surface and that has been made by impregnating from its backing surface only with a binder to from half to three quarters of its thickness.

2. A carpet according to claim 1 in which the web has been needled from its backing surface only.

3. A carpet according to claim 1 or claim 2 in which the binder contains a fungicide and/or a bactericide.

4. A carpet according to any preceding claim in which the backing surface is secured to a sheet support material.

5. A carpet according to any preceding claim in which the pile surface has been shaved.

6. A carpet according to any preceding claim in which at least a substantial proportion of the fibres of the web are polypropylene fibres.

7. A carpet according to any preceding claim in which the web is at least 2 millimeters thick and has a fibre weight of at least 200 grams per square meter and the fibres are at least 3 denier.

8. A carpet material according to claim 1 substantially as herein described with reference to the drawings.

9. A carpet material according to claim 1 substantially as herein described with reference to the Example.

For the Applicants,
GILL, JENNINGS & EVERY,
Chartered Patent Agents,
51/52 Chancery Lane,
London, W.C.2.

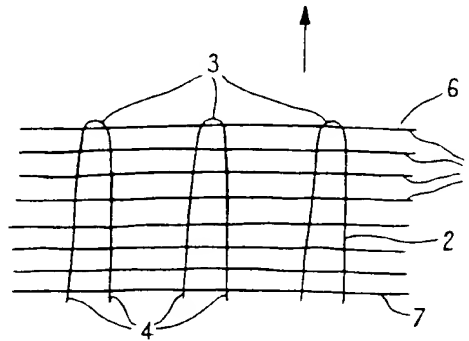


FIG. 1

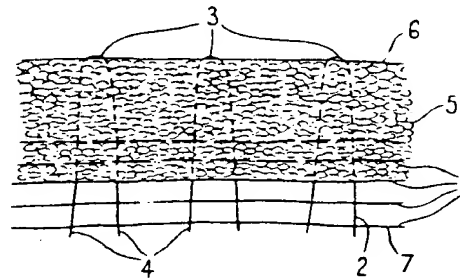


FIG. 2